

1 We claim:

1 1. A method to monitor the relative position of a magnetic tape disposed in a  
2 tape drive, wherein said tape drive comprises a first tape reel motor and a second tape  
3 reel motor, comprising the steps of:  
4 providing a magnetic tape disposed on a first tape reel, said magnetic tape  
5 comprising a first end, a second end;  
6 releaseably attaching said first tape reel to said first tape reel motor;  
7 providing a second tape reel;  
8 attaching said second tape reel to said second tape reel motor;  
9 operating said first tape reel motor and said second tape reel motor to transfer said  
10 tape from said first tape reel onto said second tape reel;  
11 maintaining a running second reel rotation count;  
12 setting a second reel rotation count limit;  
13 determining if said running second reel rotation count exceeds said second reel  
14 rotation count limit;  
15 operative if said running second reel rotation count exceeds said second reel  
16 rotation count limit, discontinuing operation of said first tape reel motor and said second  
17 tape reel motor.

1 2. The method of claim 1, further comprising the steps of:  
2 maintaining a running first reel rotation count;  
3 calculating a running difference count comprising the difference between said  
4 running second reel rotation count and said running first reel rotation count;

5           setting a running second reel rotation threshold;  
6           setting a difference count threshold;  
7           operative if said running second reel rotation count is greater than said second reel  
8 rotation count threshold, determining if said running difference count is less than said  
9 difference count threshold;  
10          operative if said running second reel rotation count is greater than said second reel  
11 rotation count threshold, and if said running difference count is less than said difference  
12 count threshold, discontinuing operation of said first tape reel motor and said second tape  
13 reel motor.

1           3.       The method of claim 2, further comprising the steps of:  
2           rotating said first tape reel in a first direction;  
3           rotating said second tape reel in said first direction.

1           4.       The method of claim 1, wherein said first tape reel motor comprises a  
2 brushless motor comprising a first rotor, a plurality of first magnetic poles disposed on  
3 said first rotor, and a plurality of first hall sensors disposed adjacent said first rotor, said  
4 method further comprising the steps of:  
5           releaseably attaching said first tape reel to one end of said first rotor;  
6           rotating said first rotor;  
7           generating a plurality of first hall signals per rotation of said first rotor;  
8           using said first hall signals to determine said running first reel rotation count.

1           5.       The method of claim 4, further comprising the step of generating 24 first  
2 hall signals per rotation of said first rotor.

1           6.       The method of claim 4, wherein said second tape reel motor comprises a  
2 brushless motor comprising a second rotor, a plurality of second magnetic poles disposed  
3 on said second rotor, and a plurality of second hall sensors disposed adjacent said second  
4 rotor, said method further comprising the steps of:

5           releaseably attaching said second reel to one end of said second rotor;  
6           rotating said second rotor;  
7           generating a plurality of second hall signals per rotation of said second rotor;  
8           using said second hall signals to determine said running second reel rotation  
9 count.

1           7.       The method of claim 6, further comprising the step of generating 24  
2 second hall signals per rotation of said second rotor.

1           8.       The method of claim 1, wherein said magnetic tape further comprises at  
2 least one servo signal extending from about said first end to about said second end,  
3 wherein said servo signal comprises longitudinal position information, and wherein said  
4 tape drive further comprises a tape head which includes at least one servo sensor capable  
5 of reading said longitudinal position information, further comprising the steps of:  
6           moving said magnetic tape adjacent said tape head;  
7           determining a PRE-EOT LPOS servo signal;  
8           determining if said PRE-EOT LPOS servo signal is detected;  
9           operative if said PRE-EOT LPOS servo signal is detected, adjusting said second  
10 reel rotation count limit.

1           9.       The method of claim 8, further comprising the steps of:

2           determining a PRE-EOT running second reel count when said PRE-EOT LPOS  
3   servo signal is detected;  
4           determining an incremental second reel count; and  
5           adjusting said second reel rotation count limit to equal said PRE-EOT running  
6   second reel count plus said incremental second reel count.

1           10.     An article of manufacture comprising a computer useable medium having  
2   computer readable program code disposed therein to monitor the relative position of a  
3   magnetic tape disposed in a tape drive, wherein said tape drive comprises a first tape reel  
4   motor, a second tape reel motor, and a second tape reel attached to said second tape reel  
5   motor, the computer readable program code comprising a series of computer readable  
6   program steps to effect:

7           releaseably attaching a first tape reel to said first tape reel motor, wherein said  
8   first tape reel includes a magnetic tape comprising a first end and a second end;

9           operating said first tape reel motor and said second tape reel motor to transfer said  
10   magnetic tape from said first tape reel onto said second tape reel;

11          maintaining a running second reel rotation count;

12          receiving a second reel rotation count limit;

13          determining if said running second reel rotation count exceeds said second reel  
14   rotation count limit;

15          operative if said running second reel rotation count exceeds said second reel  
16   rotation count limit, discontinuing operation of said first tape reel motor and said second  
17   tape reel motor.

1           11.     The article of manufacture of claim 10, said computer readable program  
2     code further comprising a series of computer readable program steps to effect:  
3           maintaining a running first reel rotation count;  
4           calculating a running difference count comprising the difference between said  
5     running second reel rotation count and said running first reel rotation count;  
6           setting a running second reel rotation threshold;  
7           setting a difference count threshold;  
8           operative if said running second reel rotation count is greater than said second reel  
9     rotation count threshold, determining if said running difference count is less than said  
10    difference count threshold;  
11           operative if said running second reel rotation count is greater than said second reel  
12    rotation count threshold, and if said running difference count is less than said difference  
13    count threshold, discontinuing operation of said first tape reel motor and said second tape  
14    reel motor.

1           12.     The article of manufacture of claim 11, said computer readable program  
2     code further comprising a series of computer readable program steps to effect:  
3           rotating said first tape reel in a first direction;  
4           rotating said second tape reel in said first direction.

1           13.     The article of manufacture of claim 10, wherein said first tape reel motor  
2     comprises a brushless motor comprising a first rotor, a plurality of first magnetic poles  
3     disposed on said first rotor, and a plurality of first hall sensors disposed adjacent said first

4 rotor, said computer readable program code further comprising a series of computer  
5 readable program steps to effect:

6 releaseably attaching said first tape reel to one end of said first rotor;  
7 rotating said first rotor;  
8 receiving a plurality of first hall signals per rotation of said first rotor;  
9 using said first hall signals to determine said running first reel rotation count.

1 14. The article of manufacture of claim 13, said computer readable program  
2 code further comprising a series of computer readable program steps to effect receiving  
3 24 first hall signals per rotation of said first rotor.

1 15. The article of manufacture of claim 13, wherein said second tape reel  
2 motor comprises a brushless motor comprising a second rotor, a plurality of second  
3 magnetic poles disposed on said second rotor, and a plurality of second hall sensors  
4 disposed adjacent said second rotor, said computer readable program code further  
5 comprising a series of computer readable program steps to effect:

6 rotating said second rotor;  
7 receiving a plurality of second hall signals per rotation of said second rotor;  
8 using said second hall signals to determine said running second reel rotation  
9 count.

1 16. The article of manufacture of claim 15, said computer readable program  
2 code further comprising a series of computer readable program steps to effect receiving  
3 24 second hall signals per rotation of said second rotor.

1           17.     The article of manufacture of claim 10, wherein said magnetic tape further  
2 comprises at least one servo signal extending from about said first end to about said  
3 second end, wherein said servo signal comprises longitudinal position information, and  
4 wherein said tape drive further comprises a tape head which includes at least one servo  
5 sensor capable of reading said longitudinal position information, said computer readable  
6 program code further comprising a series of computer readable program steps to effect:  
7           moving said magnetic tape adjacent said tape head;  
8           determining a PRE-EOT LPOS servo signal;  
9           determining if said PRE-EOT LPOS servo signal is detected;  
10          operative if said PRE-EOT LPOS servo signal is detected, adjusting said second  
11 reel rotation count limit.

1           18.     The article of manufacture of claim 17, said computer readable program  
2 code further comprising a series of computer readable program steps to effect:  
3           determining a PRE-EOT running second reel count when said PRE-EOT LPOS  
4 servo signal is detected;  
5           receiving an incremental second reel count; and  
6           adjusting said second reel rotation count limit to equal said PRE-EOT running  
7 second reel count plus said incremental second reel count.

1           19.     A computer program product usable with a usable with a programmable  
2 computer processor having computer readable program code embodied therein method to  
3 monitor the relative position of a magnetic tape disposed in a tape drive, wherein said

4 tape drive comprises a first tape reel motor, a second tape reel motor, and a second tape  
5 reel attached to said second tape reel motor, comprising:  
6 computer readable program code which causes said programmable computer  
7 processor to releaseably attach a first tape reel to said first tape reel motor, wherein said  
8 first tape reel includes a magnetic tape comprising a first end and a second end;  
9 computer readable program code which causes said programmable computer  
10 processor to operate said first tape reel motor and said second tape reel motor to transfer  
11 said magnetic tape from said first tape reel onto said second tape reel;  
12 computer readable program code which causes said programmable computer  
13 processor to maintain a running second reel rotation count;  
14 computer readable program code which causes said programmable computer  
15 processor to receive a second reel rotation count limit;  
16 computer readable program code which causes said programmable computer  
17 processor to determine if said running second reel rotation count exceeds said second reel  
18 rotation count limit;  
19 computer readable program code which, if said running second reel rotation count  
20 exceeds said second reel rotation count limit, causes said programmable computer  
21 processor to discontinue operation of said first tape reel motor and said second tape reel  
22 motor.

1 20. The computer program product of claim 19, further comprising:

2 computer readable program code which causes said programmable computer  
3 processor to maintain a running first reel rotation count;



4 computer readable program code which causes said programmable computer  
5 processor to calculate a running difference count comprising the difference between said  
6 running second reel rotation count and said running first reel rotation count;  
7 computer readable program code which causes said programmable computer  
8 processor to receive a second reel rotation count threshold;  
9 computer readable program code which causes said programmable computer  
10 processor to receive a difference count threshold;  
11 computer readable program code which, if said running second reel rotation count  
12 is greater than said second reel rotation count threshold, causes said programmable  
13 computer processor to determine if said running difference count is less than said  
14 difference count threshold;  
15 computer readable program code which, if said running second reel rotation count  
16 is greater than said second reel rotation count threshold, and if said running difference  
17 count is less than said difference count threshold, causes said programmable computer  
18 processor to discontinue operation of said first tape reel motor and said second tape reel  
19 motor.

1 21. The computer program product of claim 20, further comprising:

2 computer readable program code which causes said programmable computer  
3 processor to rotate said first tape reel in a first direction;

4 computer readable program code which causes said programmable computer  
5 processor to rotate said second tape reel in said first direction.

1           22.    The computer program product of claim 19, wherein said first tape reel  
2    motor comprises a brushless motor comprising a first rotor, a plurality of first magnetic  
3    poles disposed on said first rotor, and a plurality of first hall sensors disposed adjacent  
4    said first rotor, further comprising:  
5           computer readable program code which causes said programmable computer  
6    processor to releasably attach said first tape reel to one end of said first rotor;  
7           computer readable program code which causes said programmable computer  
8    processor to rotate said first rotor;  
9           computer readable program code which causes said programmable computer  
10   processor to receive a plurality of first hall signals per rotation of said first rotor;  
11          computer readable program code which causes said programmable computer  
12   processor to determine said running first reel rotation count using said first hall signals.

1           23.    The computer program product of claim 22, further comprising computer  
2    readable program code which causes said programmable computer processor to receive  
3    24 first hall signals per rotation of said first rotor.

1           24.    The computer program product of claim 22, wherein said second tape reel  
2    motor comprises a brushless motor comprising a second rotor, a plurality of second  
3    magnetic poles disposed on said second rotor, and a plurality of second hall sensors  
4    disposed adjacent said second rotor, further comprising:  
5           computer readable program code which causes said programmable computer  
6    processor to rotate said second rotor;

7 computer readable program code which causes said programmable computer  
8 processor to receive a plurality of second hall signals per rotation of said second rotor;  
9 computer readable program code which causes said programmable computer  
10 processor to determine said running second reel rotation count using said second hall  
11 signals.

1 25. The computer program product of claim 24, further comprising computer  
2 readable program code which causes said programmable computer processor to receive  
3 24 second hall signals per rotation of said second rotor..

1 26. The computer program product of claim 19, wherein said magnetic tape  
2 further comprises at least one servo signal extending from about said first end to about  
3 said second end, wherein said servo signal comprises longitudinal position information,  
4 and wherein said tape drive further comprises a tape head which includes at least one  
5 servo sensor capable of reading said longitudinal position information, further  
6 comprising:

7 computer readable program code which causes said programmable computer  
8 processor to move said magnetic tape adjacent said tape head;

9 computer readable program code which causes said programmable computer  
10 processor to determine a PRE-EOT LPOS servo signal;

11 computer readable program code which causes said programmable computer  
12 processor to determine if said PRE-EOT LPOS servo signal is detected;

13 computer readable program code which, if said PRE-EOT LPOS servo signal is  
14 detected, causes said programmable computer processor to adjust said second reel  
15 rotation count limit.

1 27. The computer program product of claim 26, further comprising:

2 computer readable program code which causes said programmable computer  
3 processor to determine a PRE-EOT running second reel count when said PRE-EOT  
4 LPOS servo signal is detected;

5 computer readable program code which causes said programmable computer  
6 processor to receive an incremental second reel count; and

7 computer readable program code which causes said programmable computer  
8 processor to adjust said second reel rotation count limit to equal said PRE-EOT running  
9 second reel count plus said incremental second reel count.